RAND Research Brief

Supporting LANTIRN in the Expeditionary Aerospace Force

The Expeditionary Aerospace Force (EAF) concept is designed to address several changes in Air Force operational needs. In addition to providing the Air Force with greater flexibility for operations, the EAF concept seeks to reduce personnel "turbulence" while controlling peacetime costs. RAND's EAF combat support research evaluates how alternative support structures, technologies, and methods affect EAF capabilities.

Nearly all the issues that have led the Air Force to adopt the EAF concept are present in intermediate maintenance operations for Low Altitude Navigation Targeting Infrared for Night (LANTIRN) pods. LANTIRN support easily lends itself to new structures such as consolidation that may improve the effectiveness and efficiency of the EAF support system. Such new repair structures may help the Air Force cut turbulence and provide more stable deployments for LANTIRN support personnel. Research on LANTIRN support issues can also offer insights on dealing with issues relating to aging equipment and technology obsolescence.

THE LANTIRN SYSTEM AND ITS COMPONENTS

The LANTIRN system comprises two independently operated pods mounted under the fuselage of an F-15E, F-16C, or F-16D aircraft. The navigation pod enables pilots to fly at low altitudes, even in limited visibility, and thus avoid detection by unfriendly forces. The targeting pod illuminates targets for precision-guided munitions.

LANTIRN pods and their support equipment are based on technology dating from the mid-1980s. Although they are still an essential part of combat operations, LANTIRN pods are becoming obsolete and eventually will be replaced by newer technology. The support technology is increasingly unreliable, and growing obsolescence of spare parts makes it increasingly difficult to repair both pods and test sets. Given current attrition rates, by 2002 there will be fewer targeting pods than LANTIRN-capable aircraft. Nevertheless, the Air Force must maintain a support system for the remaining pods to fully realize their remaining use.

The Air Force currently uses a decentralized structure for LANTIRN maintenance, deploying full sets of testers with LANTIRN-capable aircraft from home bases to Forward Operating Locations (FOLs). The study team evaluated alternatives to this current structure ranging from using a single Continental United States (CONUS) Support Location (CSL) to using a CSL in network with two to four Forward Support Locations (FSLs).

In addition to these logistics structures, the team evaluated options to upgrade LANTIRN support equipment, including investment in an Advanced Deployment Kit and a Mid-Life Upgrade, which are designed to reduce the deployment footprint and potentially improve support equipment performance and reliability. In fact, the researchers found that without such upgrades the current decentralized structure can no longer meet timeline requirements for expeditionary operations.

DEPLOYMENT AND TRANSPORTATION TIMES

Both centralized and decentralized LANTIRN repair operations face critical time constraints. Figure 1 shows the expected targeting pod availability under a decentralized support structure seeking to provide 80 percent availability, or 0.8 good targeting pods per aircraft operating during the halt phase in a two-major-theater-war (MTW) scenario. In the decentralized structure, the challenge is to deploy and set up equipment within four days of the beginning of combat operations. If deployment and setup take more than one day, then targeting pod availability for non-engaged aircraft (including aircraft used for training) begins to decrease. If deployment and setup take more than four days, then targeting pod availability for engaged

aircraft begins to decrease. Data collected during the Air War Over Serbia (AWOS) indicate that these deployment and setup times need to be much shorter than the nine to ten days it currently takes to deploy the LANTIRN mobility shelter set (LMSS) under peacetime conditions to ensure pod availability in coincident, large-scale engagements.

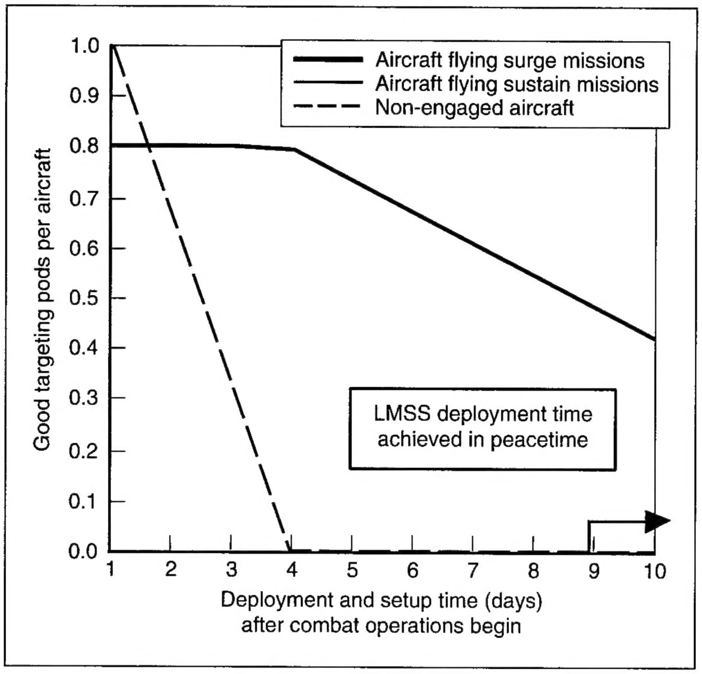

Figure 1—Decentralized Support Targeting Pod Availability During Second MTW

In centralized structures, the key performance variable is the time it takes to transport pods between support and operating locations. Figure 2 shows the expected targeting pod availability under a centralized support structure seeking to provide 80 percent availability during the halt phase of a second major theater war. Because centralized support must supply all aircraft worldwide, the figure shows the availability of pods for aircraft flying sustainment operations. For this analysis, the researchers set a pod availability goal of 0.6 good targeting pods per aircraft engaged in sustainment operations. If one-way transportation time exceeds four days, there are no pods available for non-engaged aircraft and targeting pod availability for engaged aircraft begins to decrease. Current CONUS to out-of-CONUS transportation averages seven to ten days, meaning that LANTIRN support cannot rely on a CONUS-only support structure. Data from the Air War Over Serbia indicate that intratheater transportation times, which ranged from three to five days during that contingency, may be able to support a maintenance network comprising FSLs and CSLs. The Air Force also may want to evaluate the goals it has set for pod availability. Aircraft use rates are rarely 100 percent, meaning that lower pod availability goals can be met simply by moving pods from aircraft not being used to those that are.

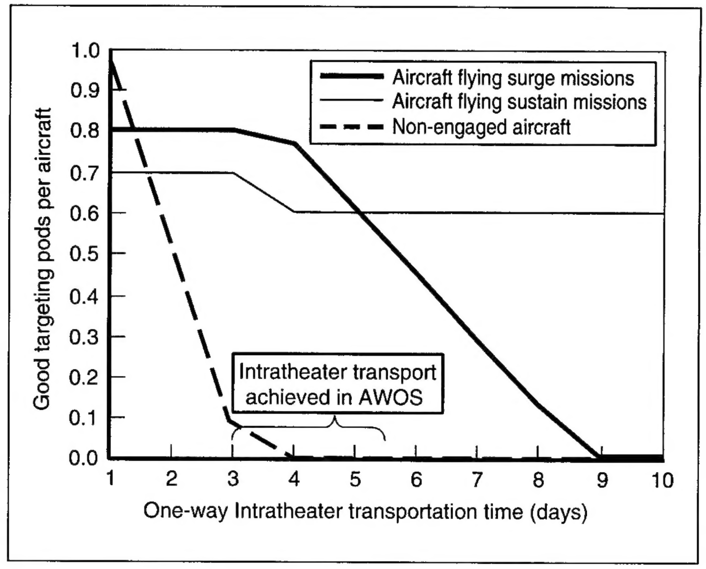

Figure 2—Centralized Support Targeting Pod Availability During Second MTW

OTHER SUPPORT TRADEOFFS

Time is the critical variable to consider in designing LANTIRN support structures, but there are several other tradeoffs as well. These include strategic and operational risks, deployment footprint, and organizational issues.

A decentralized support structure is extremely sensitive to airlift availability in the early phase of a mission. Decentralized structures are also sensitive to tester downtime, because the failure of just one tester can shut down LANTIRN repair at a decentralized location. EAF goals require a reduction in the deployment footprint, but decentralized repair has a large footprint. For some wartime scenarios, deployment of decentralized LANTIRN support requires the movement of 139 persons and, depending on upgrade investments, up to 341 pallets of support equipment. Equipment upgrades would require fewer pallets for deployment and help decentralized structures to meet performance timeline requirements.

Though extremely sensitive to transportation times, consolidated support overcomes many difficulties that may be posed by the decentralized structure. By collocating testers, consolidated support structures avoid the risk that the breakdown of just one tester can halt repair at a location. Collocation can also increase test string productivity and reduce test set demand. If, for example, the effective demand of one squadron is for three-fourths of a tester, then three centralized testers can serve four squadrons. Consolidated support can considerably reduce the deployment footprint. Under the consolidated LANTIRN support structure, fewer than 50 persons, and no pallets of equipment, are required to move for certain contingency deployments.

Centralized and decentralized structures carry substantially different types of investment and operational costs, but the total recurring costs for centralized and decentralized structures are approximately the same. This minimizes the importance of costs as a criterion for selecting a support structure. More important, analysis of AWOS pod failure data indicates that the Air Force may not have enough test equipment to support multiple major contingencies. This implies that a very large investment may be needed to ensure the Air Force's ability to meet planned combat scenarios. Another important issue for any change may be organizational. Under a consolidated structure, unit commanders will have to relinquish some of their control over LANTIRN pods. They will also have to communicate closely with the support centers and other bases served by the same consolidated facility. Performance metrics and incentive systems may need to change to ensure unit satisfaction, on-time delivery, and quality workmanship.

CONCLUSIONS AND RECOMMENDATIONS

Although a system relying on a CSL in network with FSLs introduces new transportation time risks, the study team concluded that such a system offers distinct advantages over the current system. The most viable structure would use two FSLs and one CSL, all with the Advanced Deployment Kit upgrade. This option consistently ranks high when all options are considered by performance and risk measures, including pod availability and deployment footprint. Although the underlying premise of the FSL-CSL network is that no equipment moves in support of deployed units, the Advanced Deployment Kit offers additional flexibility to accommodate scenarios that the fixed support structure could not.

During the Air War Over Serbia, the USAF employed some of the centralized repair concepts proposed by RAND research. Fighter aircraft deployed to an FOL in Italy received LANTIRN support from their home base at Lakenheath, UK. No LANTIRN support equipment deployed to the FOL and pods were transported via multiple modes, enabling responsive support. While this limited experience did not fully stress the LANTIRN centralized support system, it provided insights to the potential feasibility of such a system. Based on RAND work prior to the Air War Over Serbia and the lessons learned from the war, the study team recommends that the benefits and risks associated with LANTIRN repair consolidation be explored further. As a first step, it recommends investment in the Advanced Deployment Kit to ensure continued repair capabilities and improve deployment flexibility. Both RAND research and the Air War Over Serbia have shown that a transportation system able to respond to a wide variety of scenarios ranging from peacetime to two coincident major theater wars is necessary for successful centralized repair operations. Thus, the team's second recommendation is to reevaluate intratheater transportation system capabilities—starting with the command and control processes used to manage materiel movement. Only after gaining a solid understanding of the transportation system capabilities can the Air Force pursue implementation plans for centralized repair structures.

RAND research briefs summarize research that has been more fully documented elsewhere. This research brief describes work done for RAND's Project AIR FORCE; it is documented in Supporting Expeditionary Aerospace Forces: Expanded Analysis of LANTIRN Options, *by Amatzia Feinberg, Hyman L. Shulman, Louis Miller, and Robert S. Tripp, MR-1225-AF, 2000, 97 pp., ISBN 0-8330-2903-7, available from RAND Distribution Services (Telephone: 310-451-7002; toll free 877-584-8642; FAX 310-451-6915; or E-mail: order@rand.org). Abstracts of RAND documents may be viewed on the World Wide Web (http://www.rand.org). Publications are distributed to the trade by NBN. RAND® is a registered trademark. RAND is a nonprofit institution that seeks to improve policy and decisionmaking through research and analysis; its publications do not necessarily reflect the opinions or policies of its research sponsors.*

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